

SOME
NEW HINTS,
RELATIVE TO
The Recovery of Persons drowned,
A N D
APPARENTLY DEAD:
WITH

A View to render that Practice more generally
successful.

By JOHN FULLER, Surgeon, at Ayton,
BERWICKSHIRE.

Nostrum est, ~~curare~~ medicis dimitatem faci, dum turpitudinem, et infusam, evitare volumus, et non resipire, hinc
utique in eis, ex quo resipire, et ad animam esse
perfectam quod modo conducere videatur.

NICHOLLS.

L O N D O N:
Printed for T. CADELL, Strand; and C. ELLIOT,
Edinburgh.
M D C LXXXIV.

THE FEW FOLLOWING

H I N T S

ON TIPS

Recovery of Persons Drowned and apparently Dead,

ADDRESSED TO THE

HUMANE SOCIETY,

Are most usefully done.

Sir WILLIAM FORDYCE,

AND

Dr. WILLIAM HAWES,

Physician to the Surrey Dispensary, Registrar to the HUMANE SOCIETY,
and Reader of Lectures on Animation, &c. &c.

By their much obliged,

And most obedient humble Servant,

JOHN FULLER.

To James Campbell
with best Compts
from J. C. Antho

S O M E
N E W H I N T S, &c.

G E N T L E M E N,

THE attempt to recover persons, who are in danger of death from having been under water, is a matter in which all men are so obviously interested, that it appears to me to be the duty of every one who has chosen physic or surgery for his profession, to suggest any means that may occur to him, that have not yet been tried, and that he thinks can contribute to so benevolent a purpose.

B

This

This impression of duty is the only apology that I shall trouble you with, for venturing to lay before you the following ideas, which, after much reflection, I am full of opinion may prove useful.

A person is said to be drowned, and apparently dead, when respiration and the circulation of the blood (from the submersion of the body in water) have ceased; but that the person is in a state of death at the instant, or very soon after these effects are produced, appears, by long experience and the clearest evidence, to be by no means generally the case. We find that what is called the vital principle of animals subsists in the body in a great variety of cases (especially in those of drowning and others similar) for a considerable length of time after respiration and the consequent circulation of the blood have been stopt. I shall

not

not presume to determine the real causes of death in persons that die from drowning, the difficulties in which this doctrine is involved, and to which it is subjected in physical argument, render it a subject more deserving the labours of an abler pen, and better suited to a person who has the opportunity of making observations from dissecting the bodies of those who may fall unfortunate victim to drowning, or such other causes. I apprehend it is sufficient for the present purpose to know that although the total extinction of the living principle in animals is the inevitable consequence of a cessation, for a certain time, of the respiratory and circulatory organs, yet, while this vital principle subsists in the body after respiration has ceased for some time, in such force as to be acted upon by certain stimulants, thereby increasing its powers and the irritability of the whole system,

and ultimately the restoration of the vital and of all the other functions of the body, we are by no means to despair of success, even in cases where the body has lain for a long time under water. The numerous instances of such recoveries now presented to us by the Humane Society, afford ample and pleasing proofs of the reality of the principle laid down; and it is from this principle, I observe, that all the authors, who have written on Animation, have formed their indications, and by which they have conducted their practice; " and as it thus appears [as the very justly celebrated Dr. Cullen observes] that life does not alone depend on the circulation of the blood, but especially depends upon a certain state of the nerves and muscular fibres by which they are sensible and irritable, and upon which the action of the heart itself depends," I am led to propose the two following

lowing Indications, which I think will answer every intention of recovery that I am at present to offer. And the first is,
TO STIMULATE THE SYSTEM IN GENERAL :

2d, **TO STIMULATE THE INTESTINES, STOMACH, HEART, AND BRAIN, DIRECTLY.**

The particular mode of conducting this practice I shall proceed to describe with all possible brevity. And first, after the drowned body is taken out of the water, and carefully conveyed to the place where the recovery is to be attempted, no time is to be lost in putting into immediate execution the various means recommended by the Humane Society for the purpose of drying, generating and increasing the natural heat of the body. While this is doing, let large cakes of wax, made as warm as the wax will

will bear without melting, or any other non-conducting substance of the electric fluid, be brought; and having covered this non-conducting substance with warm, thick blankets, let the body be laid out upon it in an easy, natural posture, with the head pretty much raised, and let the body be well covered and wrapt up in the blankets. Matters being in this state, I would next apply an electrical apparatus to the drowned body; and its being thus insulated, and after the electric fluid (seemingly so analogous to that nervous fluid, which we have partly lost, and which we are endeavouring to accumulate and re-animate) has pervaded the whole system, let sparks of electric fire be drawn from all the sensible parts of the body, especially along the course of the large blood vessels, at the same time, every now and then, gentle electric shocks, in a general manner, should be exhibited; du-

ring

ting this process, continue the friction on the surface of the body through the blankets; and when these begin to grow cold, let them be exchanged for others kept ready warm: but this trouble, as well as exposing the body to the cold air, may be saved, and the body supplied with artificial heat by running warm smoothing-irons along the outside of the blankets. Great care ought to be taken that the blankets do not touch the ground while sparks of fire are drawing off, and that the feet and axillæ are kept very warm with heated bricks or bottles, filled with warm water. The artificial heat of the body ought to be supported in as equal a manner as possible. While these things are going on, stimulating glysters may be administered, and some warm wine or warm brandy and water may be poured into the stomach in the manner directed by

the

the learned and ingenious Dr. Monro: Would not æther thrown into the stomach prove a more active stimulus? Does not the sympathetic connection, that seems evidently to subsist in a high degree between the stomach and the skin, clearly point out the propriety, that while we continue the friction on the surface of the body, some suitable warm cordial should now and then be administered to the stomach in small quantities? But, before proceeding far, in these measures, I humbly think, that the taking some ounces of blood from the jugular veins ought to be had recourse to sooner and oftener than is usually done:

The probability of congestion in the head taking place, in cases of drowning, is much to be apprehended, especially in young plethoric habits, and where the head, during submersion, has been the lowermost part of the

the body; and as in such cases where congestion is actually present, the losing a certain quantity of blood from the jugular veins, temporal artery, or by cupping the temples, must be attended with evident advantage, I am inclined to believe that it is sometimes neglected with irreparable loss. The very great suffusion of blood generally observed in the eyes and face of a drowned person is (I am humbly of opinion) *a præsori*, a strong indication of bleeding in the neck, or cupping the temples. The stimulus, from cupping, appears by no means to be an immaterial step, exclusive of any other effect it may produce. Bleeding, however, is never to be employed in such cases, unless by the direction of one of the medical assistants, or some other respectable gentleman of the faculty, who has paid attention to such unfortunate accidents.

The Humane Society, in this respect, have acted most judiciously; for, at the same time that they guard us against the indiscriminate use of the lancet, from their candour and earnest desire for the recovery of life, they very properly allow the Faculty to act, at such times, as their judgment directs them. On what cause does this suffusion depend? Why does the suffusion of blood, in the case of a drowned and a hanged person, appear equally great? In the act of hanging, does the constriction of the rope upon the neck totally obstruct the circulation of the blood in all those vessels that carry the blood to the pericranium? and also in those that return it? and do both these effects take place at the same instant? and are these effects instantaneously produced upon respiration ceasing? Does the heart instantly cease to contract when the lungs become quiescent? If it

it does not, what is the cause of its contraction? and in the contraction is it supplied with any blood, and from what parts of the body? And if blood is thrown out of the ventricle or ventricles of the heart, where is it carried to? why is the right ventricle commonly found full of blood after drowning and hanging? and why is the same ventricle sometimes found empty? how is the left ventricle sometimes found filled with blood to be accounted for?

The next most important steps which appear to me necessary to be taken, are those which are meant to answer the second indication, and they are principally electricity, the inflation of the lungs with air, and, lastly, the transfusion of warm blood from a living animal into the right auricle or ventricle of the heart; and that these material steps should be taken very early in the at-

tempt towards a recovery, will (I presume) evidently appear from the following observations, which I beg leave to premise before entering on the particular manner in which I shall advise them to be put in execution.

1. That as the living principle and the natural heat of the body are coeval with each other, the sooner we regenerate and increase that heat, so much sooner will the vital principle again become active.
2. That in proportion to the degree of this natural heat, in the same proportion (I mean principally in drowned bodies) will the force of the vital principle be found to exist.
3. That the living principle subsists in the heart in greater force, and for a longer time

time after the circulation of the blood has ceased, than in any other part of the body ; and that from its being an entire muscular organ originally intended for contraction, the speedy irritation of it in the grand work of resuscitation, becomes an object of the first importance, as the contraction of the heart always has been the ultimate object to which all the various methods hitherto tried for restoring suspended animation have been directed, because until that effect is produced, respiration, and every other function of the animal œconomy, must remain inactive.

4. That the more remote from the heart, the vital principle will be found to subsist in less force than in those parts more nearly situated to it.

5. That

5. That this principle prevails more in all the interior than in those of the exterior parts.

From all this, I would deduce, that the sooner we can stimulate these essential organs of life, we shall have a better chance of succeeding in rekindling the remaining sparks of it; at the same time, I must here take notice, that to proceed to the execution of these measures without the greatest caution, might be attended with fatal effects—for what may be the consequence of stimulating the brain, heart, lungs, &c. forcibly upon the unfortunate object being first taken out of the water! In the first place, the shock might be so powerful as totally to destroy the latent principles of life. 2, Suppose it should not, but that a disposition in these organs to renew the action of their respective functions took place, yet,

yet, unless the tendency was very strong, indeed, even the heart itself beginning to act, and its influence becoming very generally diffused over the system, I am afraid that the very powerful sedative effects on the nervous system, that must attend such a particular state of the surface of the body and alimentary canal, induced from submersion in water, would counteract these exertions of the muscular system so much, that, although there were some signs of returning life, it would be in danger of being again extinguished.

The happy effects that have often arisen from rubbing the surface of the body alone, in cases of drowning, strongly recommend that, not only as a necessary preparatory step to those more essential, but as a piece of the process that ought to be continued all the time the attempt is carried on, and by

thus combining the friction on the surface of the body, with the other internal applications, the chance of success must be much increased by such an universal stimulus being kept up.

As soon as these preparatory steps are taken, I would advise inflating the lungs with dephlogisticated air, which the learned Dr. Fothergill has had the honor to discover possessing qualities that render it not only much better adapted for the purpose of simple inflation than the atmospheric air, but that it also evidently possesses qualities which, from the ingenious experiments he has made on suffocated animals, appear to be peculiarly fitted for blowing up the dwindling flame of life, along with the alternate inflation of the lungs imitating natural respiration : let (as Dr. Fothergill points out) strokes of electricity be directed successively through the head, heart,

heart, and lungs, and also along the course of the alimentary canal, to be varied and exhibited in such force as may, from the circumstances of the case, appear best suited to it.* The last attempt, towards resuscitating the apparent dead body, and which I propose with great diffidence, is the transfusion of living blood (suppose that of a lamb or sheep) into the right auricle or ventricle of the heart. The manner of doing it may be thus: After the drowned body has been well dried, rubbed, insulated, spark of electric fire drawn from all the more sensible parts of the body, and gentle shocks exhibited in a general manner, warm stimulating glysters administered, warm cordials poured into the stomach, the

D

Lungs,

* Dr. FOTHERGILL'S Letters on Animation, contained in an Address to the KING and PARLIAMENT, on preserving the Lives of the inhabitants of Great Britain, published by Dr. HAWES. See the third edition.

lungs inflated alternately, shocks of electricity directed through the head, heart, stomach, intestines, &c. Let a lamb or sheep be brought and fixed to some machine, so as it cannot move its head or any part of the body, then lay bare one of the carotid arteries of the living animal; next make an incision, with a lancet, into the right external jugular vein of the drowned person, as large as to admit the end of a silver tube, somewhat curved, into the cavity of the vein, pointing it towards the heart. When this is done, make another incision, obliquely downwards, into one of the carotid arteries of the animal, into which introduce the other extremity of the tube directed towards its heart. Let the wound in the artery be higher (with respect to the ground) than the incision made in the vein; and the orifices of the wounds should be no larger than the extremities of the tube completely fill up. I would recommend, that

that the diameter of the orifice at the extremity of the tube, next to the animal, should be made larger than at its other extremity next to the drowned person.

Matters being in this situation, I humbly conceive, that the blood from the carotid artery of the animal will, by the strong pulsation of its heart, be carried to the right ventricle of the heart of the drowned person by mechanically forcing open the valv. tricuspid. or from that effect being produced in consequence of a contraction of the right auricle taking place from the blood being thrown with a sudden jerk into its cavity, unless that the right ventricle is so much distended with blood, that the resistance arising from such dilatation is greater than the impulse of the blood acting mechanically upon the valv. tricuspid. or than that which is produced from the contraction of the auricle. Let us here con-

sider, what we may expect from living blood being thus thrown into the right ventricle of the heart, and surely we must suppose that a contraction of it will be the immediate or speedy consequence, if there exists in the heart as much of the vital principle as in any case where a recovery is at all practicable. We see that the contractile power of the heart of a frog continues so long, that for nearly the space of half an hour after it has been cut out of the body, when it lays on a table and is pricked with a pin, a contraction ensues. This experiment I have frequently seen performed by Dr. Monro. From this, I presume, it appears demonstrable, that the influx of living blood into either the right auricle or ventricle of the heart, must necessarily act as the most powerful stimulus that can be applied to the vascular system in cases of resuscitation, and may

may therefore, probably, succeed in that view, when all other means of excitement have failed. But supposing the blood thrown in does not arrive at the right ventricle, for the cause abovementioned, but that it only reaches the auricle either then empty, or mixes with the blood it contains at the time, what may the consequence be in this case? I apprehend that even in the auricle, from the motion and irritation of the warm blood thrown in acting by itself (if the auricle be empty) or by mixing with the blood in the auricle, thereby exciting the same motions and action against the sides of the auricle, a contraction of it must take place, if there remains in the auricle a certain degree of sensibility; the immediate effect of which would naturally be, the forcing open the valv. tricuspid. and thereby, from sympathy, but principally from the irritation arising from the sudden

transmission of warm blood into the right ventricle, a contraction of it, surely, in this case may be expected to follow. And supposing the valv. tricuspid. not to yield to the impulse of the blood, during the contraction of the auricle, yet from the sympathy just now mentioned, and the particular irritation given to the valv. tricuspid. which are connected to the inside of the right ventricle, I have reason to hope, that the action of the right ventricle would also, under such circumstances, be brought to succeed that of the auricle, which, in effect, obviates the distention and surcharge of the right ventricle, and the consequence of that again must be the driving of the blood through the substance of the lungs, carrying it to the left auricle and left ventricle of the heart; and ultimately, from the undoubted contraction that would take place in the left ventricle (in such a precise case) the blood will be dis-

distributed to all the different parts of the body.

It may be objected to this practice, that the congestion of blood in the heart is perhaps the cause of death, or from its surcharge counteracts (in a manner I can not at present attempt to explain) all our efforts to restore suspended animation; and that, therefore, the addition of more blood is adding to the morbid cause. To this objection, I would observe, that the simple additional distention of the ventricle arising from the greater influx of blood, must, in my humble opinion, act as a powerful stimulus in soliciting the ventricle to contract, independent of any other irritable qualities the blood may possess, as containing most of the living principles of an animal. Are we not to suppose that such a distention as the one just now mentioned, does take

take place in many cases where a recovery is effected? Is it not possible to conceive that the reiterated friction on the surface of the body, commonly employed in the recovery of drowned persons, does mechanically force some blood into those vessels that carry it directly to the right auricle and ventricle of the heart? And besides, is it not probable that independent of those effects from friction (in those cases where success attends our efforts) as the re-animation of the body goes on, and the vascular system begins to acquire more irritability, and it arrives at a certain pitch, blood does begin to flow gradually towards the right auricle and right ventricle of the heart, and when it is there accumulated in a certain quantity, the heart at last is compelled to yield to the increasing stimulus, so that its functions and those of the whole machine are happily restored?

restored? By this, I do not by any means wish to be understood, that I suppose the contraction of the heart depends upon the accumulation of the blood in this manner; I only mention it as a conjecture that it may in some measure take place, in particular cases, and thereby contribute in some degree to that effect, and with the view to support the consistency of the practice of the transfusing of blood directly into the right auricle or ventricle of the heart.

Upon the supposition that congestion is present in the right ventricle of the heart, how is it to be overcome? It certainly cannot be effected by any other means than by the contraction of the heart, which, of itself, is not to be supposed to take place without the intervention of stimulants applied to the body, so as to communicate their effects to the heart in such force as

to occasion its contraction. It may be asked, why does not the heart contract in consequence of the blood it of itself contains, and which is perhaps still warm, when the drowned body is taken out of the water? To this I would answer, that at the time the cause of suffocation is removed, there are present, acting upon the system, a variety of causes tending to extinguish what little spark of life may remain; such as the cold benumbed state of the surface of the body, the particular collapsed state of the lungs; there is, perhaps too, such congestion in the brain as deprives the heart of its nervous energy, besides the blood in the ventricles of the heart must, by this time, have lost much of its vivifying and stimulating quality, and the heart much of its irritability; by this it appears, that, in this case, the heart cannot possibly be set in motion again till it receives a

greater

greater stimulus than what may be supposed to arise from the mechanical weight of the blood in its ventricles.

I am of opinion, that the agitation* of the body alone, in some cases, restores life,

or

* Dr. Hawe, on the recovery of JAMES BARTON, of St. Clement's Dock, observes as follows: "I found the body exceeding cold, totally insensible; but could I, upon the third examination, perceive the least pulsation or respiration, or any other vital action. In about a quarter of an hour, having gained no ground, I made a very strong solution of emetic tartar, and with great difficulty forced down a tea-spoon full at a time, and, to render it the more effective, I caused the afflatus to agitate the body considerably."—See Report of the Humane Society, in the year 1785, p. 19.

It appears to me, that the agitation of the body has a very powerful effect in restoring a man, and this is also further corroborated in the method of treatment laid down by the HUMANE SOCIETY; and I recollect moreover, that Dr. Hawe inferred the following from his strong conviction of its importance as an auxiliary in the work of resuscitation; and particularly from its carrying good effects in the above case.

or brings on a contraction of the heart from the motion and friction of the blood thus occasioned within its cavities, and this step recommended by the ingenious Dr. Hawes, to be taken in cases where persons have not lain long under water, and consequently where the vital principle is not much exhausted, is I presume founded on this principle.

To return to the manner of transfusing the blood: I would have a stop-cock near the

" While the various means of recovery are made use of
 " by the *assistants*, the body is to be well shaken every
 " ten minutes, in order to render the process more cer-
 " tainly successful; and the bodies of *children* in parti-
 " lar are to be much agitated, by taking hold of their
 " arms and legs frequently, and for a continuance of time.
 " In a variety of instances agitation, in conjunction with
 " the methods laid down, has forwarded the recovery of
 " boys who had been drowned, and continued for a con-
 " siderable time apparently dead." — A small pamphlet,
 containing the mode of treatme^tit, published by the Hu-
 mane Society, p. 12.

the end of the tube next to the drowned person, for the purpose of regulating the quantity of blood to be thrown in; and I would recommend to have tubes either of different lengths, or a tube made of different pieces to join together, so as to have the power of directing the blood in greater or less force, as circumstances may seem to require. Either at the instant that the blood is made to pass into the right auricle or ventricle of the heart, or immediately afterwards, I presume it will be proper to direct strokes of electricity first through the head, and then through the heart; at the same time to continue the inflation of the lungs alternately with dephlogisticated air. The quantity of blood to be thrown in, or how often it is to be repeated, I can by no means at present pretend to ascertain; experience alone must determine it: but I should imagine it would be prudent to begin with

small quantites at a time. If so much blood should be thrown into the heart as to give reason to apprehend the danger of a surcharge of the vessels, it will be easy to take away a part either from the neck or arm.

But it may be right to consider, whether it would be most proper to take away some blood before the transfusion, or after it has taken place; and whether it should be done immediately on the close of the operation of transfusion, at the first sign of returning life, or when animation is so far advanced as that no danger can arise from venesection.

I conclude with observing, that the success that frequently attends stimulating those parts of the body, where the vital principle exists the least, which is on the surface,

surface, ought very much to warrant and encourage the trial of topical applications; but that the former should always precede the latter for some little time, and that they should be carried on hand in hand in the future part of the process, is evidently clear from the reasons formerly assigned.

If, upon an unprejudiced trial, the above rude hints are found to contribute in any degree to the humane purpose for which they are intended, I shall embrace the first opportunity to enter more at large on the subject; and will, at the same time, endeavour to shew in what diseases resembling death, the several remedies here recommended for the recovery of persons drowned, or suffocated from other causes, may be applicable. Observations, therefore, which may tend to advance or illustrate the important

portant inquiry of suspended animation,
will be most gratefully received and ack-
nowledged.

I have the honor to be,

with the greatest respect,

GENTLEMEN,

Your most obedient

and most humble servant,

LONDON,

July 31, 1784.

JOHN FULLER.